Mobilizing climate finance for livestock transformation in the Global South

PATHWAYS FOR INVESTMENT READINESS

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LiveSys
Catalysing Transformation towards Sustainable Livestock Systems

SUMMARY

Livestock systems sustain more than one billion people worldwide, most of them in low- and middle-income countries, making the sector central to food security, nutrition, and rural livelihoods across the Global South. At the same time, livestock accounts for roughly one fifth of agricultural greenhouse gas emissions, primarily methane. With global demand for animal sourced foods projected to double by 2050, countries face a dual imperative to raise productivity and resilience while substantially reducing emissions.

Climate finance provides a practical pathway to address this challenge. By mobilizing public, blended, and private capital, governments can reduce the risk of investments in improved forages, enhanced grazing management, and low emission feed and manure systems. Such investments can simultaneously increase productivity, strengthen adaptive capacity, and generate measurable mitigation outcomes.

Evidence from CGIAR and partners shows that sustainable intensification can reduce emission intensity by up to half while increasing yields and farm incomes. **Proven technologies are already available, but financial mechanisms and institutional capacity to scale them remain insufficient**. Transforming livestock systems therefore requires:

A. ***Policy alignment, integrating livestock into national climate strategies, Nationally Determined Contributions, and investment plans.***
B. ***Robust monitoring, reporting, and verification (MRV) systems that produce credible and transparent data to confirm results and attract investment.***
C. ***Blended finance instruments that strategically combine concessional, private, and results-based funding to mobilize capital at scale.***

For African member states, the key policy task is to integrate livestock into national climate and investment frameworks, build credible MRV systems, and develop bankable livestock programs that can access concessional, blended, and results-based finance. Donors and research institutions play a complementary role by providing the data, standards, and tools that make livestock projects auditable, investable, and scalable. When governance, data, and finance converge, livestock can shift from being perceived mainly as a source of emissions to becoming a driver of low carbon, climate resilient growth and a strategic development opportunity for the Global South.

From underinvestment to opportunity

Globally, livestock systems reveal a stark contrast between developed and developing regions. In North America and the European Union, animal numbers have remained relatively stable while production levels are high and efficient. These mature systems achieve productivity gains primarily through genetics, feed efficiency, animal health, and technology rather than herd expansion.

In contrast, Least Developed Countries and Low-Income Food-Deficit Countries have experienced rapid growth in animal numbers but only modest increases in output (**Figure 1**). This pattern reflects largely extensive systems constrained by low productivity. The divergence underscores a persistent efficiency gap between the Global North and South. Closing this gap requires sustainable intensification, which increases production through improved practices, better technologies, and more efficient resource use rather than expanding herd size, thereby advancing both food security and emission reduction goals.

Within the Global South, Latin America follows an intermediate trajectory. Total livestock production has risen substantially in recent decades, yet efficiency gains remain uneven. Countries such as Brazil, Argentina, and Uruguay have made important progress through improved pastures, better feed management, and genetic improvement. However, much of the region's growth still depends on herd expansion rather than higher productivity per animal.

Productivity can increasingly be sustained without proportional herd growth through improved feed quality and digestibility, stronger herd health and reproductive management, genetic advancement, and strategic shifts in production systems and species composition. For example, transitions from low-productivity extensive beef systems toward more intensive dairy, dual-purpose, or small-ruminant systems can generate higher output per unit of land and lower emission intensity per unit of product. Significant potential therefore remains to enhance efficiency, reduce emission intensity, and sustain production growth without expanding animal numbers.

In Africa, FAOSTAT data (FAO, n.d.) show that livestock populations have more than doubled since 1960, yet productivity per animal has remained largely stagnant. In Eastern, Central, and West Africa, production growth has been driven mainly by herd expansion. Southern Africa and, more recently, Northern Africa show modest gains in yield per animal, indicating early signs of decoupling output from emissions, where production increases are achieved primarily through higher productivity and efficiency rather than proportional growth in livestock numbers and associated greenhouse gas emissions. Although Figure 1 focuses on cattle, similar dynamics are observed across other ruminant and monogastric species, with low-income regions exhibiting herd expansion-led growth and high-income regions achieving productivity-driven gains (Herrero et al., 2023).

Across much of Africa, productivity levels remain up to ten times lower than in industrialized systems. This gap is not primarily due to biophysical constraints but to chronic underinvestment in public goods and enabling systems. Evidence shows that low-input livestock systems are constrained by limited access to quality feed, veterinary services, extension, infrastructure, and finance rather than by inherent inefficiencies of the production environments themselves (Herrero et al., 2023).

In many African contexts, livestock also function as savings, insurance, and cultural capital, reinforcing herd accumulation as a risk management strategy in the absence of reliable markets and financial services. Strategic investments in enabling systems, particularly feed markets, animal health delivery, breeding programs, and market integration, can shift incentives away from herd expansion toward productivity-led growth. This transition increases output per animal while reducing emission intensity.

Africa's livestock sector therefore represents not only an emissions challenge but also a major development and climate finance opportunity. For Africa, livestock are not only a climate challenge but also a strategic asset for food security, livelihoods, resilience, and rural transformation. The relevant policy question is therefore how to support better livestock systems that improve productivity and adaptive capacity while lowering emissions



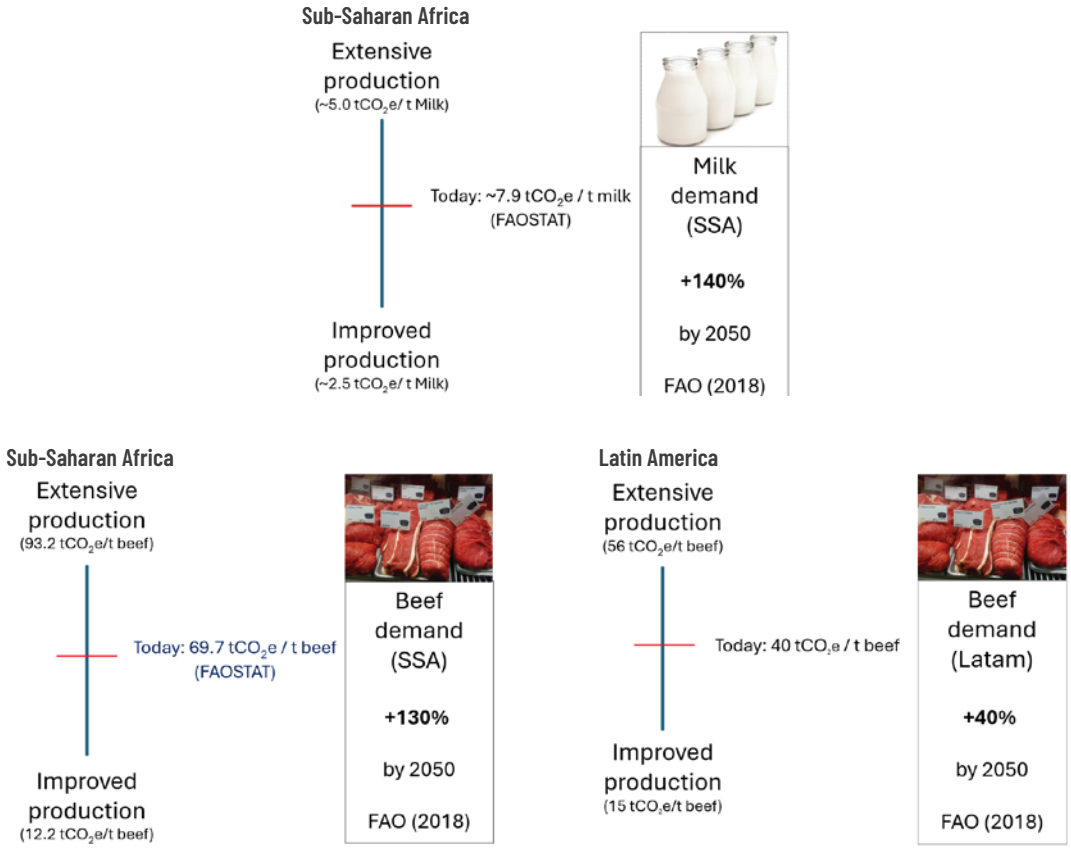
Figure 1. Beef cattle population, production, productivity across several regions (FAO, n.d.)

intensity. In this context, AU-IBAR and the African Union can play a catalytic role by supporting policy alignment, harmonized MRV approaches, project preparation, and knowledge exchange across member states.

Well-designed investments can simultaneously strengthen food security, raise rural incomes, enhance resilience, and improve emission efficiency, generating economic, social, and environmental returns.

The most promising practices include the introduction of high-biomass, drought-tolerant forage species, manure composting, feed supplementation with legumes or agro-industrial by-products, and improved herd management to raise productivity per animal while reducing the number of unproductive livestock (**Figure 2**). Emerging evidence from Kenya, Ethiopia, and Zambia (Costa Jr. et al., 2025b) shows that targeted forage improvement combined with soil carbon restoration can generate measurable gains in both production and climate outcomes, particularly when supported by access to credit, extension services, and digital monitoring tools.

Together, these regional experiences demonstrate that low-emission, high-productivity livestock systems are not theoretical constructs but practical realities grounded in existing technologies, adaptive management, and enabling finance mechanisms. The remaining challenge is to scale these solutions through coordinated investment, policy alignment, and robust MRV systems that recognize and reward measurable environmental performance.



Scientific evidence shows that transforming livestock systems toward higher productivity and lower emissions is both feasible and already underway in several regions. These findings are drawn from real-world production systems and demonstrate that substantial efficiency and mitigation gains can be achieved with technologies and practices already available. The remaining challenge is scaling.

In Latin America, multiple studies confirm that pasture-based intensification can deliver simultaneous productivity and mitigation benefits. Costa Jr. et al. (2025b) show that intensifying pasture systems through improved forages, rotational grazing, and balanced nutrition can reduce beef emission intensity by 30 to 50 percent while increasing production by about 40 percent. These gains are driven by deep-rooted tropical forages such as *Urochloa* (syn. *Brachiaria*) and *Megathyrsus* (syn. *Panicum*) species, integrated soil fertility management, and silvopastoral systems that enhance soil organic carbon, biodiversity, and animal performance. Countries including Brazil, Colombia, and Paraguay demonstrate that the strategic use of improved forages, shade trees, and nutrient recycling through composting and manure management can make livestock systems more resource efficient and climate resilient.

Similarly, in Sub-Saharan Africa, Quintero et al. (under review) estimate that widespread adoption of improved forages, sustainable intensification, and climate-smart grazing management could meet a projected 130 to 140 percent increase in beef and milk demand by 2050 while reducing emissions by up to 60 percent compared to a business-as-usual trajectory.

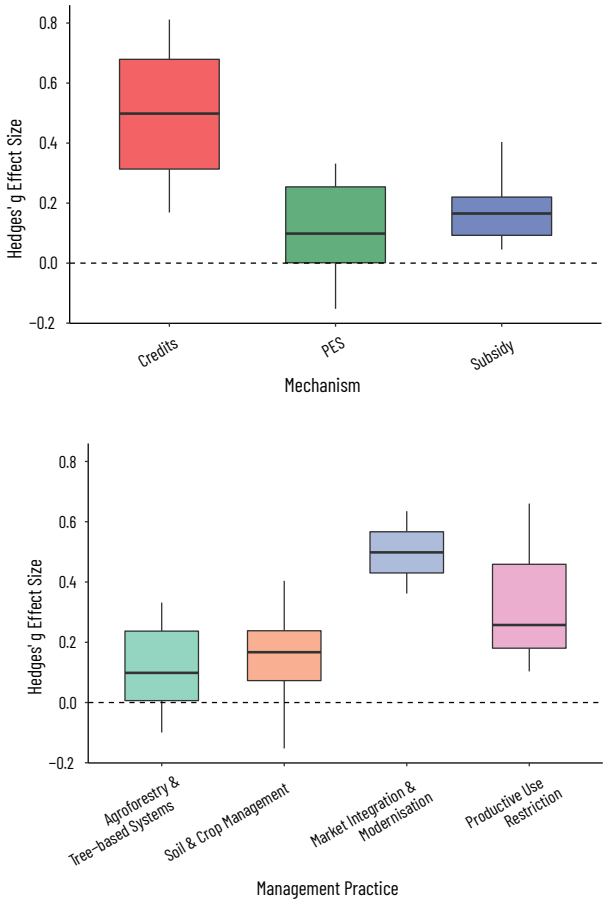
Figure 2. Sustainable livestock intensification: Emission reduction potential and demand growth in Sub-Saharan Africa and Latin America

The role of climate finance in shaping livestock futures

The future of the livestock sector will depend on whether production continues to rely on herd expansion or shifts toward higher productivity, stronger resilience, and lower emissions intensity per unit of output. Climate finance can help steer the sector toward the latter pathway by supporting investments in efficiency, technology, and improved management that increase output while reducing emission intensity. Yet less than one percent of global climate finance currently reaches the livestock sector, leaving a substantial gap between scientific evidence and implementation (FAIRR, 2025). Closing this gap represents a strategic investment opportunity to generate multiple returns, including lower methane and overall greenhouse gas emissions, higher farm productivity and incomes, improved food security, and healthier soils and ecosystems.

Mobilizing public and private capital through blended finance instruments, carbon markets, and payment for ecosystem services schemes could reposition livestock from a perceived climate liability to a pillar of climate-smart development. With appropriate incentives and risk-sharing mechanisms, these investments could unlock one of the largest untapped mitigation and adaptation opportunities within global food systems, particularly in the Global South.

Climate finance is especially critical because many low-emission interventions require upfront investments that producers cannot easily afford. Evidence from CGIAR (**Figure 3**) and Costa Jr. et al. (2025a) indicates that carbon-linked income can increase the cash-on-cash return of livestock investments by about 1.7 times, raising profitability from 3.5 to 6.0 percent at a carbon price of USD 20 per ton of CO_2 equivalent (CO_2e). Although carbon revenues alone are modest, they provide stable and predictable income streams that improve liquidity and facilitate access to credit.



Costa Jr. et al. (2025a)

Findings from recent CGIAR research show that credit and investment mechanisms generate the largest and most consistent gains in farmer income and productivity, as reflected in higher effect sizes. These instruments expand access to capital, technology, and improved inputs that enable sustainable intensification.

In contrast, Payments for Ecosystem Services (PES) and carbon credit schemes show smaller but strategically important effects. They function as complementary incentives that reward environmental performance, strengthen accountability, and support sustained adoption. Parallel evidence on management practices indicates that the strongest income effects come from market integration and modernization, followed by soil and crop management and agroforestry systems. This highlights that productivity gains and associated climate benefits are greatest when smallholders are better connected to value chains, information, and finance.

For the livestock sector, these findings suggest that climate finance should prioritize productivity-oriented investments such as credit facilities, blended finance, and impact funds, complemented by results-based mechanisms like Payments for Ecosystem Services or carbon payments to ensure environmental integrity. Together, these approaches can transform livestock development into an investable opportunity that reduces risk, strengthens competitiveness, and aligns farmer incentives with national climate and development goals.

Figure 3. Climate finance pathways for low-emission livestock development

Major climate-finance mechanisms and their relevance to livestock

A coherent climate finance architecture can accelerate livestock transformation when tailored to sector realities. Each mechanism, whether public, blended, or private, plays a distinct but complementary role in reducing risk, mobilizing private capital, and rewarding verified results. Please refer to **Annex 1** for a summary.

The Green Climate Fund (GCF): Financing policy reform and large-scale transformation

The GCF is the world's largest mechanism for financing low-emission and climate-resilient development. It supports programs that combine policy reform, technical assistance, and concessional investment. In the livestock sector, GCF resources can drive national transformation programs that integrate pasture rehabilitation, water and manure infrastructure, improved forages, and low-emission feed systems, while embedding measurable emission intensity reduction targets alongside productivity, resilience, and inclusion benefits.

The GCF has financed climate-resilient agriculture programs that include livestock components such as rangeland rehabilitation, sustainable grazing management, improved water access, early warning systems, and climate-smart value chains. These investments focus primarily on strengthening adaptive capacity in pastoral and agro-pastoral communities, reducing land degradation, enhancing drought preparedness, and promoting practices that lower emissions while improving productivity. Although these initiatives are shifting systems toward more resilient and lower-emission production, they remain limited relative to the scale of climate risks facing the sector.

The GCF project cycle begins with a concept note prepared by an accredited entity, such as a national ministry, multilateral development bank, or UN agency, and endorsed by the National Designated Authority (NDA). After review and approval by the GCF Board, projects move to implementation under a structured results framework. GCF's Results Management Framework ensures that mitigation and adaptation outcomes are measurable, reportable, and verifiable.

Because GCF capital absorbs early-stage risk, it is well suited to anchor public and private investment platforms for livestock. Concessional loans can be channeled through local financial institutions or cooperatives to finance forage establishment, rotational grazing, or manure management, with repayment conditions linked to verified emission intensity reductions. This approach was demonstrated under the Pathways to Dairy Net Zero initiative in East Africa, co-financed by the GCF, which achieved a 29 percent reduction in emission intensity while increasing farmer incomes.

Scaling livestock programs under the GCF nevertheless faces persistent barriers. Many countries lack livestock-specific climate strategies, investment roadmaps, and cross-ministerial coordination, making it difficult to prioritize livestock within national pipelines. Technical constraints, including limited baseline data, Tier 2 emission factors, and digital monitoring systems, further complicate proposal development and impact verification. Livestock investments are also often perceived as high risk due to smallholder fragmentation, limited collateral, and long payback periods, discouraging commercial finance.

These constraints can be addressed by using GCF readiness resources to establish sectoral MRV systems, national emission databases, and project preparation facilities dedicated to livestock. Governments can integrate livestock mitigation into updated NDCs, develop programmatic proposals, and introduce policy incentives that link productivity gains with verified emission reductions. Financially, the GCF can reduce risk through blended structures, guarantees, and results-based payments, while partnering with research organizations such as CGIAR, FAO, and ILRI to strengthen technical credibility. Together, these measures can move livestock investments from isolated pilots to national programs capable of attracting private co-investment and delivering measurable climate impact.

The Global Environment Facility (GEF) and Adaptation Fund: Readiness, innovation, and inclusion

Complementing the GCF, the GEF and the Adaptation Fund (AF) play essential upstream roles in building readiness, generating data, and testing innovations that enable larger investments. Their project cycles begin with concept endorsement by national focal points, followed by approval by the GEF Chief Executive Officer or the AF Board and implementation through accredited entities such as FAO, IFAD, or UNDP. These mechanisms provide grants for capacity building, data generation, and pilot demonstrations that prepare countries for GCF or blended finance proposals.

The GEF has supported livestock-related activities mainly through broader food systems and land management programs, focusing on sustainability, resilience, and emission reduction across value chains. The AF has financed projects that benefit livestock producers primarily through climate adaptation and rural resilience interventions rather than through dedicated livestock investment windows. Both funds offer opportunities to strengthen engagement in the livestock sector by supporting targeted investments in low-emission technologies, productivity-enhancing practices, and integrated mitigation and adaptation approaches that address existing financing gaps.

In the livestock sector, GEF and AF resources are particularly valuable for developing Tier 2 and higher emission factors, establishing monitoring frameworks, and testing low-methane feed systems, improved tropical forages, and composting or manure recycling technologies that enhance soil carbon and reduce methane. They also strengthen institutional capacity across ministries and research institutions, support coordination among agriculture, environment, and finance agencies, and promote social inclusion by reaching women, youth, and smallholders through training, extension, and incentive programs.

An example is the GEF-supported Climate-Smart Livestock Management (CSLM) project in Ecuador, implemented by FAO. Operating across major cattle and dairy regions, the project combined policy reform, technical assistance, and green credit mechanisms to improve pasture management, animal nutrition, and manure handling. Within four years, it achieved a 17.7 percent reduction in greenhouse gas emission intensity per unit of milk and meat and a 10.7 percent increase in household income among participating livestock families. The project illustrates how GEF grants can deliver measurable mitigation and livelihood outcomes while building the institutional and data foundations for larger GCF or private sector investments. Similar models are being replicated in other Latin American countries through FAO and GEF partnerships.

Despite this progress, livestock-related GEF and AF programs face challenges including limited national emission data, fragmented institutional mandates, and difficulties scaling pilot initiatives into broader investment programs. Overcoming these barriers requires prioritizing data generation and digital monitoring infrastructure, expanding use of the GEF Capacity Building Initiative for Transparency (CBIT), and designing pilots with clear scaling pathways that produce cost curves, emission factors, and MRV protocols aligned with larger GCF and blended finance proposals.

Blended Finance and impact funds: Driving productivity and competitiveness

Blended finance, defined as the strategic use of concessional public capital to mobilize commercial investment, is emerging as one of the most effective mechanisms to finance productivity and sustainability gains in agrifood systems. Recent analyses by the Climate Policy Initiative (2025a) show that well-structured blended vehicles can reduce perceived risk, attract private capital, and align incentives across public and private actors. Philanthropic capital can play a catalytic role by providing early-stage grants, first-loss tranches, technical assistance, and innovation funding to de-risk novel livestock investment models and crowd in larger public and commercial flows.

In the livestock sector, these instruments are well suited to finance productivity-enhancing practices such as pasture renovation, improved herd management, better forages, and feed

optimization, while embedding methane reduction and land use safeguards within investment criteria. A livestock-focused blended facility can extend long-term credit to cooperatives and producer organizations, backed by public guarantees and concessional tranches, with repayment conditions linked to verified climate outcomes, including reductions in emission intensity. Philanthropic partners can strengthen such facilities by financing MRV systems, pipeline development, and capacity building for producer organizations, areas often considered too early stage for commercial lenders.

The Blended Finance Playbook for Climate-Smart Agrifood Systems (Climate Policy Initiative, 2025b) highlights that pairing financial structures with robust monitoring systems and technical assistance increases leverage ratios and strengthens impact durability. Complementing this, the Climate Finance Roadmap for Livestock in Latin America and the Caribbean (Climate Policy Initiative, 2025c) estimates that although the sector receives less than USD 240 million annually in climate finance, funding needs exceed USD 180 billion to meet productivity and mitigation targets. Bridging this gap will require concessional public finance, private capital, and strategic philanthropic engagement to absorb early risk and accelerate innovation.

A compelling example is the AGRI3 Fund Cattle Project in Brazil. Through a USD 6 million ten-year loan to Grupo Vilela de Queiroz, co-financed with Rabobank and supported by a 30 percent first-loss guarantee, the facility enabled large-scale pasture restoration, soil improvement, and forest protection across more than 2,600 hectares. Stocking rates are increasing from 1.6 to 2.8 animal units per hectare while more than 2,000 hectares of Legal Reserve and Permanent Preservation Areas are being restored. Productivity and sustainability targets are directly linked to loan performance, aligning financial returns with verified climate outcomes. Developed through a partnership between Rabobank, the Dutch Ministry of Foreign Affairs, and the United Nations Environment Programme (UNEP), AGRI3 demonstrates how de-risking mechanisms can mobilize private investment into climate-smart livestock systems. Philanthropic co-investment or grant windows within such models could expand access for smaller producers and earlier-stage projects.

Scaling these models requires several core features. Public guarantees and concessional tranches are essential to absorb risk and attract commercial participation, while repayment conditions tied to verified climate outcomes ensure accountability. Integrating MRV systems and technical assistance within financing structures strengthens borrower capacity and lowers transaction costs. Working through cooperatives enables aggregation of smallholders and improves access to credit. Dedicated philanthropic windows can support pipeline development, innovation pilots, and gender-responsive financing mechanisms, enhancing inclusivity and accelerating readiness for commercial scaling. Close alignment with national climate strategies and NDC priorities is critical to leverage donor participation and multilateral co-financing.

Significant barriers remain, including a limited pipeline of investment-ready projects, insufficient MRV data, high transaction costs, and weak coordination between financial and agricultural institutions. These constraints can be addressed through readiness programs that develop standardized MRV templates and prepare project pipelines (e.g., GEF, GCF), while national development banks and cooperatives establish credit registries that reduce perceived risk. Partnerships with local financial institutions can channel blended capital more effectively, and embedded technical assistance can ensure that productivity and environmental outcomes advance together. Philanthropic funding is particularly valuable in overcoming upstream barriers by supporting data systems, capacity development, and demonstration projects that enable larger-scale investment.

Building on the AGRI3 model, establishing dedicated livestock blended finance and impact funds would allow countries to scale sustainable intensification and verified emission reductions, replacing input-based subsidies with performance-linked finance. Beyond mobilizing capital, such facilities would generate a pipeline of science-based, bankable projects capable of delivering measurable gains in productivity, methane mitigation, and rural incomes, positioning livestock as an investable and climate-aligned growth strategy.

Green and sustainability bonds

Green bonds issued by companies or governments are attractive to investors because they typically carry lower risk than equities, diversify portfolios, and provide predictable income through periodic interest payments, known as coupons, over a defined maturity period. They are designed to mobilize capital for environmentally sustainable projects, including in the livestock sector. In this context, green bonds can finance initiatives that reduce greenhouse gas emissions, improve resource efficiency, and promote climate-smart practices across value chains. Eligible investments may include improved manure management, enhanced animal health systems, biogas production, sustainable grazing, feed efficiency technologies, and rangeland restoration. By linking capital to measurable environmental outcomes such as reduced methane emissions or increased soil carbon sequestration, green bonds provide a mechanism to support low-emission, climate-resilient livestock development while attracting sustainability-oriented investors.

However, issuing green bonds in emerging and developing economies is often constrained by high coupon rates on government debt denominated in local currency. Coupons are typically higher in these markets due to currency volatility and weaker sovereign credit ratings. For example, Ethiopia has issued government bonds in USD at around 6.65%, while bonds in Ethiopian birr carry rates of approximately 20%. By comparison, Germany issues bonds at roughly 2 to 4% depending on maturity. Servicing such high coupon obligations requires strong and reliable investment returns, meaning that proposed projects must be demonstrably bankable and financially robust, or strategically prioritized for policy reasons.

One way to reduce coupon rates is to obtain a second party opinion (SPO) that independently assesses and validates the environmental credibility and feasibility of the proposed investments. This can strengthen investor confidence, improve bond pricing, and enhance access to capital.

Voluntary Carbon Markets (VCM) and Article 6 Mechanisms: Rewarding verified outcomes

Livestock carbon projects operate under a pay for performance model in which farmers, cooperatives, or companies receive finance for verified reductions or removals of greenhouse gas emissions. Projects typically progress through five stages: feasibility assessment, methodology selection, project design and validation, implementation with MRV, and credit issuance and sales. Eligible activities include pasture restoration and soil carbon enhancement, feed and forage improvements that reduce enteric methane, and improved manure management, each delivering measurable climate benefits alongside productivity and resilience gains.

A global assessment by FAO (Wollenberg et al., 2025) finds that livestock projects account for most agrifood-related carbon credits issued to date. However, this portfolio is heavily concentrated in manure methane biogas projects in China, which dominate both credit issuance and the project pipeline. Credits linked to pasture restoration, feed efficiency, or soil carbon sequestration remain limited. Overall, agrifood systems generate only about one percent of total VCM credits, highlighting the early and underdeveloped stage of agricultural participation.

Several approved methodologies enable livestock systems to access carbon finance. Key examples include VM0042 for improved agricultural land management, which quantifies soil and pasture carbon gains; VM0032 for sustainable grassland management; VM0039 for methane emission reductions from manure management systems; and VM0041 for reducing enteric methane through feed additives. The Gold Standard Soil Organic Carbon Framework provides a modular approach for mixed systems, and additional methodologies targeting enteric methane reduction through improved forages are under development. Together, these tools form a growing but still fragmented framework for quantifying livestock-related emission reductions and removals.

Despite their potential, livestock carbon projects face structural barriers, including high monitoring costs, limited baseline data, and challenges in aggregating smallholders. Carbon prices remain modest, around USD 6 to 7 per ton of CO_2e for soil and pasture projects and about USD 15 for agroforestry. Even at these levels, revenues can strengthen project bankability and support sustained adoption. In Latin America, strong beef and dairy supply chains combined with measurable soil carbon and grassland restoration potential create favorable conditions for scaling carbon crediting. In Sub-Saharan Africa, extensive rangelands and emerging digital monitoring and aggregation platforms enable cost-effective participation and smallholder inclusion. Aligning national livestock carbon frameworks with Article 6 cooperation can reposition livestock as a credible and investable climate solution.

Several emerging projects illustrate replicable approaches for integrating carbon finance into livestock systems. In Kenya, the Kajiado Rangelands Carbon Project uses VM0032 to restore degraded grasslands through rotational grazing, with an estimated sequestration of about 6 million tons of CO_2e over 30 years and projected revenues of USD 20 to 25 million reinvested in community enterprises. The Boomitra Grassland Restoration Project across Kenya, Tanzania, and Uganda applies VM0042 and satellite-based monitoring to track soil carbon gains across 1.5 million hectares, reducing roughly 2.3 million tons of CO_2e annually and potentially generating more than USD 10 million per year at scale. In Colombia, the Hacienda San José (HSJ) Climate-Smart Cattle Ranching Project applies VM0042 to combine adaptive multi paddock grazing, deep-rooted tropical forages such as Urochloa humidicola, and native tree regeneration. The project aims to mitigate more than 7 million tons of CO_2e over 30 years, with potential revenues of USD 40 to 60 million depending on market conditions.

Climate action co-benefits: Ecosystem Services and biodiversity in livestock farming

Beyond reducing greenhouse gas emissions, sustainable livestock systems generate important co-benefits for ecosystems and communities. Practices such as silvopastoral systems, rotational grazing, and the use of multipurpose forages enhance carbon sequestration while improving soil health, regulating water flows, and conserving biodiversity. These outcomes position livestock systems within the broader climate and biodiversity nexus (Florez et al., 2025).

PES schemes and emerging biodiversity credit markets offer mechanisms to reward livestock keepers for maintaining ecosystem functions, including water regulation, soil fertility, and habitat provision. Although these instruments remain relatively small compared to other sources of climate finance, explicitly recognizing ecosystem services as co-benefits of climate action can help unlock larger funding streams and strengthen the contribution of livestock systems to both climate and biodiversity objectives (Pappagallo, 2018).

Toward an Integrated Livestock Finance Ecosystem

Together, these mechanisms form a complementary architecture for livestock climate finance:

- The GEF/AF build readiness and generate essential data.
- The GCF scales investments through policy reform and blended credit structures.
- Blended finance instruments drive productivity and competitiveness.
- Carbon markets and Article 6 mechanisms reward verified outcomes and sustain long-term engagement.

When strategically sequenced within national frameworks, this financing ecosystem can deliver productivity growth alongside measurable mitigation, positioning livestock as a cornerstone of low-carbon, climate-resilient development.

Building livestock finance readiness: From concept to investment

Transforming livestock systems into climate finance ready investment programs requires a structured and sequential approach that moves from strategic vision to verified impact (Figure 4). Countries can follow a four-stage pathway to translate climate ambitions into bankable and scalable programs that deliver measurable mitigation, adaptation, and productivity outcomes.

This progression from policy alignment and piloting to investment design and long-term scaling builds the institutional capacity, data systems, and financial instruments needed to make results verifiable, investable, and sustainable. Depending on existing capacity, countries may enter at different stages, but all must ultimately integrate livestock into national climate strategies, demonstrate cost effectiveness, and institutionalize monitoring and finance mechanisms to ensure lasting impact.

Stage 1 – Concept and policy alignment

The first step toward livestock climate finance readiness is to explicitly embed livestock within national climate strategies and investment frameworks. Mitigation and adaptation objectives for the sector should be reflected in NDCs, Long Term Strategies (LTS), and agricultural investment plans to ensure policy legitimacy and alignment with development partners.

Governments should identify priority livestock systems, such as extensive beef, dairy, or mixed crop livestock systems, that offer high mitigation and resilience potential. Baseline assessments to quantify emissions, sequestration potential, and socio-economic co-benefits provide the analytical foundation for targeting interventions and setting realistic targets.

Strong institutional coordination is critical. Establishing a Livestock Climate Finance Task Force that brings together agriculture, environment, and finance ministries helps align technical planning with fiscal strategy. This coordination also strengthens engagement with National Designated Authorities (NDAs) for the GCF and Operational Focal Points for the GEF, facilitating access to funding windows.

Key outputs: Livestock integrated into NDCs/LTSs; sectoral targets defined; inter-ministerial task force established; GCF/GEF concept notes initiated.

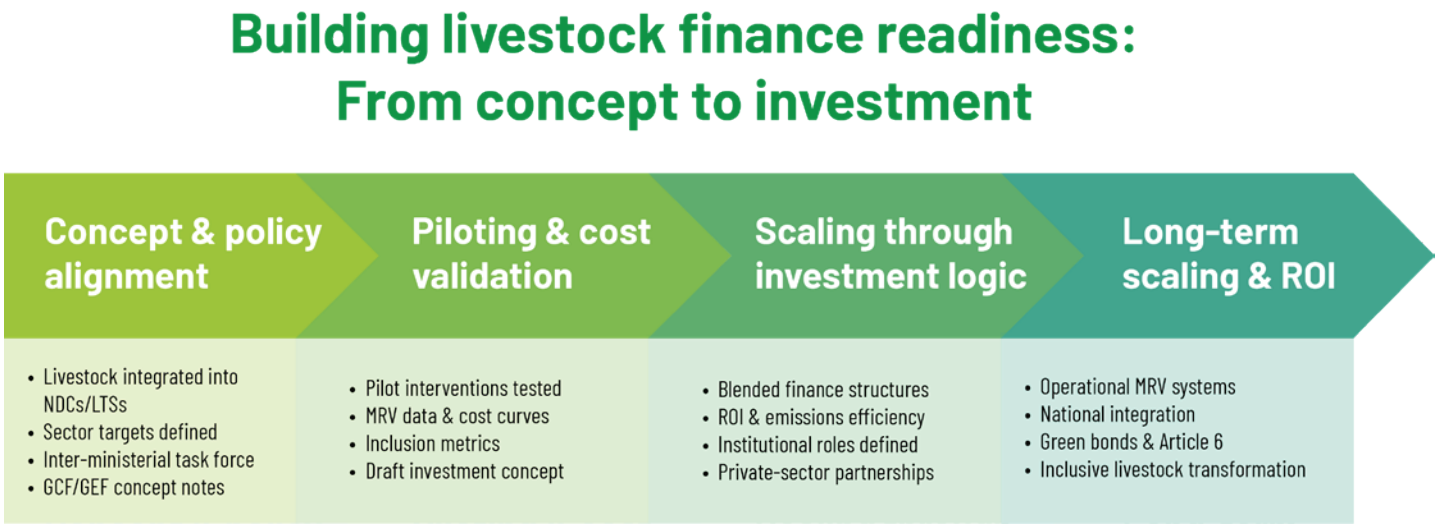


Figure 4. A stepwise approach for building bankable, scalable programs.

Stage 2 – Piloting and cost validation

The second stage focuses on piloting interventions to validate technical performance, cost effectiveness, and social inclusion. Governments and partners can draw on resources from the GEF, IFAD, or bilateral donors to test measures such as improved forages, rotational grazing, feed additives, or enhanced manure management in representative production systems.

Pilots should generate robust data on productivity gains, emission reductions, and MRV costs to develop cost curves and assess scaling potential. In Colombia and Kenya, digital MRV pilots for pasture and herd management reduced verification costs by up to 40 percent while showing that reliable data improve investor confidence and access to credit. This phase also provides an opportunity to test financial instruments, including PES, concessional loans, and results-based payments, to identify approaches that best align producer incentives with climate outcomes.

Key outputs: Validated technical and financial models; pilot MRV data and cost curves; gender and inclusion metrics; draft investment concept for submission to GCF or IFAD.

Stage 3 – Scaling through investment logic

With pilot evidence in place, countries can design investment grade programs that link productivity gains with verifiable climate outcomes. These programs should articulate a clear financial and environmental rationale, demonstrating both return on investment and emission reduction efficiency.

Governments and accredited entities can develop blended finance structures that combine concessional loans from sources such as the GCF or IFAD with commercial debt or equity from development banks and impact investors. Concessional capital absorbs early-stage risk, while private co finance enables expansion at scale.

Institutional roles should be clearly defined. Ministries and national development banks can serve as implementing agencies, research institutions and digital service providers can manage MRV systems, and private companies can act as market off takers to ensure sustained demand and creditworthiness.

Key outputs: Full project design (GEF/GCF PPF); financial model and ROI analysis; risk-sharing and institutional frameworks; private-sector partnership plan; MRV and monitoring systems defined.

Stage 4 – Long-term scaling and ROI

The final stage centers on institutionalizing systems and securing long term financial sustainability. Verified livestock initiatives should be integrated into national budgets, public private partnerships, and sectoral investment portfolios to ensure continuity beyond pilot phases.

As technical and institutional capacity strengthens, countries can access additional financing instruments such as green bonds, impact funds, and Article 6 carbon crediting mechanisms. Embedding digital MRV systems within national greenhouse gas inventories enhances transparency and alignment with NDC reporting, while verified outcomes create sustained performance-based revenue streams.

Social inclusion must remain a core principle. Programs should incorporate gender and youth responsive approaches, transparent benefit sharing arrangements, and targeted capacity building to ensure equitable participation and durable adoption.

Key outputs: Operational MRV and finance systems; integration into national investment frameworks; access to blended and market-based finance; sustainable, inclusive livestock transformation.

Eligibility and operationalization criteria for climate finance

The allocation of climate finance is guided by internationally recognized standards that safeguard environmental integrity and financial credibility. Projects must demonstrate clear and measurable climate benefits, robust monitoring systems, and alignment with national and international frameworks. Funders prioritize initiatives that combine sound technical design with tangible social and economic co benefits.

Core criteria include demonstrating additionality, protecting environmental and social safeguards, ensuring financial sustainability, and generating development impacts such as biodiversity conservation, rural employment, and gender equity. Together, these standards provide a strong framework for evaluating and prioritizing projects capable of channeling climate finance effectively toward sustainable livestock systems in Africa.

Voluntary Carbon Markets: Cases studies in african countries

Kenya: The Northern Kenya Rangelands Carbon Project (NKRCP)

The NKRCP is a large-scale soil carbon initiative and the first globally to generate carbon credits through improved livestock grazing practices.

- Location: Northern Kenya
- Scale: Approximately 1.9 million hectares
- Communities: 14 community conservancies
- Start date: 2012
- Developer: Northern Rangelands Trust (NRT)
- Standard: Verra (VCS).

The project aims to sequester about 50 million tons of CO_2e over 30 years by transforming rangeland management through rotational grazing, livestock route planning, and land protection. Soil organic carbon is increased through planned grazing and improved rangeland management.

Table 1. Key eligibility criteria.

Criteria	Practical meaning	Relevance for livestock
Mitigation and adaptation potential	Demonstrated, measurable greenhouse gas emission reductions or resilience outcomes with clear indicators.	Supports reductions in enteric methane emissions, improved manure management, forage innovations, and drought resilience.
Additionality	Benefits would not occur without financing; robust baselines required.	Prevents funding of common or legally mandated practices; ensures innovative livestock solutions are prioritized.
Environmental and social integrity	Risk management, "do no harm," and delivery of co-benefits (e.g., biodiversity, livelihoods).	Addresses risks of land-use change, biodiversity loss, or social exclusion in livestock intensification.
Financial viability and sustainability	Clear financial plan, repayment/co-financing mechanisms, long-term viability.	Essential for scaling livestock interventions (e.g., infrastructure, forage seed systems, feed supply chains).
Transparency, monitoring, and reporting (MRV)	Annual reporting on proceeds, impact indicators, and external verification.	Critical for results-based instruments, carbon credit projects, and green bonds in the livestock sector.
Alignment with policies and frameworks	Coherence with NDCs, adaptation plans, Paris Agreement, and green taxonomies.	Ensures livestock projects reinforce national climate strategies and attract international finance.

The project applies Verra's soil carbon methodology, combining field measurements with modeled removals, and received Triple Gold certification from the Climate, Community, and Biodiversity Alliance (CCBA) in recognition of its wildlife and community co benefits (NRT, 2022). Carbon revenues are intended to finance community development initiatives, including water access, education, and health services (NKRCP, 2023).

The first credits were issued in 2013 and, together with subsequent verified issuances, have generated USD 14.6 million for participating conservancies to date. In February 2022, each of the 14 conservancies received USD 324,000 as the first of three payments from a credit sale (NRT, 2022).

In May 2025, Verra suspended credit issuance and sales for the second time after a Kenyan court ruled that two conservancies had been established without adequate community consultation. This followed a previous suspension in 2023 related to concerns about methodology and community consent. These developments highlight critical risks related to land tenure, community participation, legal validation of conservancies, and transparency in carbon crediting (Mukpo, 2025; Plafker, 2025).

Key lessons include: first, legal clarity and genuine community consent are essential to the legitimacy of rangeland carbon projects; second, even large and pioneering initiatives face significant operational risks if governance is weak; and third, credit suspensions can disrupt revenue flows and undermine investor confidence.

Nigeria: ReSeed–CREACC-NG Carbon Farming Initiative, proxy for Livestock Sector in Nigeria

As of October 2025, no registered or verified carbon credit project in Nigeria specifically targeting livestock or rangeland management has been identified in the main voluntary carbon market registries, including Verra, Gold Standard, and Plan Vivo. To illustrate relevant mechanisms, the ReSeed-CREACC-NG initiative serves as a proxy case, as it demonstrates aggregation, monitoring systems, and benefit sharing structures that could be adapted to future livestock carbon projects.

The ReSeed-CREACC-NG project promotes regenerative agriculture and soil carbon sequestration with the objective of generating high integrity voluntary carbon credits. Launched in 2023, with pilot deployment beginning in 2024 and 2025 (ReSeed, 2023), the initiative targets Nigeria's large population of smallholder farmers and aggregates their mitigation activities into marketable carbon credits (EnviroNews Nigeria, 2023). Promoted practices include minimum tillage, cover cropping, crop rotation, and agroforestry to increase soil organic carbon. The monitoring approach combines satellite imagery, ground verification, and farmer-reported data, allowing thousands of small plots to be consolidated into a single crediting structure. This aggregation model reduces transaction costs and strengthens traceability and transparency (Ojugbele, 2023).

Carbon credits are aggregated and sold in voluntary markets, with revenues distributed to participating farmers based on verified emission reductions or removals (ReSeed, 2023). The model seeks to diversify farmer incomes while contributing to national mitigation goals. Given Nigeria's estimated 38 million smallholder farmers, the scaling potential is substantial (EnviroNews Nigeria, 2023). CREACC-NG leads community engagement, while ReSeed provides technical and market infrastructure. Key risks include regulatory uncertainty as Nigeria's carbon market framework continues to evolve, ensuring equitable benefit sharing, and maintaining monitoring integrity (Ojugbele, 2023).

Although not a livestock project, ReSeed-CREACC-NG offers relevant lessons for rangeland and grazing based carbon crediting. These include the aggregation of smallholders to access carbon markets, monitoring frameworks applicable to mixed crop livestock systems, and community-based governance that promotes transparency and inclusion. The initiative illustrates how regenerative agriculture can be scaled through aggregation, robust monitoring, and clear institutional arrangements. Similar models could be adapted to livestock systems in Nigeria by incorporating grazing management indicators, ensuring regulatory alignment, and safeguarding smallholder interests in emerging carbon markets.

Zambia: Mafisa Livestock Grazing Carbon Project (MLGCP)

The MLGCP is among the first large scale livestock-based carbon credit initiatives in Zambia and is registered under the Verra Verified Carbon Standard with Project ID 4915. It is developed by ZayoHub Zambia Ltd in partnership with CarbonSolve LLC and local traditional leadership structures. The project was validated in early 2024 and will operate over a 40-year crediting period from 2024 to 2063 (Verra, 2024).

The project generates verified carbon credits through improved grazing and fire management practices. It applies Verra methodology VM0032, Adoption of Sustainable Grasslands through Adjustment of Fire and Grazing, which quantifies carbon sequestration in grasslands through reduced fire frequency and rotational grazing. Monitoring is based on a two-tier system that combines ground level tracking of livestock movements by grazing coordinators with satellite monitoring of vegetation condition and regrowth. The project covers 1.26 million hectares of mopane and miombo woodland savannas in southwestern Zambia near Kafue National Park. Annual sequestration is projected to increase from 220,000 tons of carbon dioxide equivalent in 2024 to 1.26 million tons by 2029, with total removals exceeding 47 million tons over the project lifetime (Mafisa, 2024).

The initiative partners with more than 150 rural communities that rely on extensive cattle systems in low productivity soils. Over recent decades, unregulated grazing and frequent burning of dambos have contributed to severe grassland degradation and declining livestock productivity. The project responds by introducing planned rotational grazing, community managed fire regimes, and improved animal health services. Carbon rights are secured through agreements between ZayoHub and traditional authorities, ensuring local participation and recognition of customary governance. Revenues from carbon credit sales are intended to return to communities through investments in livestock health infrastructure, vaccines, and veterinary services, strengthening both livelihoods and carbon permanence (Mafisa, 2024).

The project represents a pioneering example of how livestock and rangeland management can generate high integrity carbon credits in sub–Saharan Africa. It demonstrates scalable approaches to landscape level rotational grazing, integration of monitoring systems with community management, and alignment of traditional governance structures with carbon market requirements. It is also aligned with Zambia's national carbon market framework, which recognizes the Verra program, positioning livestock systems as a central component of nature-based climate solutions in the country.

Final considerations

Evidence shows that livestock systems can simultaneously advance food security, rural incomes, and climate mitigation when productivity and emissions are managed together. Across tropical and subtropical regions, improved forages, better grazing management, and enhanced manure systems have reduced greenhouse gas emission intensity and increased soil carbon sequestration. Yet less than one percent of global climate finance currently reaches the sector.

Closing this gap requires translating technically proven interventions into investment grade programs backed by measurable evidence and strong institutions. Three elements are critical: credible monitoring systems that quantify and verify mitigation and adaptation outcomes; blended finance mechanisms that reward performance while reducing risk; and coherent policy frameworks that align agricultural and environmental objectives.

For African member states, upscaling does not need to start with complex financial instruments. It can begin with a simple sequence: plan, pilot, and scale. Livestock should first be integrated into national climate frameworks, then supported through proven pilot interventions and basic MRV systems, and finally scaled through concessional and blended finance, with carbon markets and bonds playing a complementary role where readiness exists.

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